

# ***Fundamentals of T&E***



**16 April 2002**



***Trusted agent of the American Soldier***

# Agenda

- Our mission
- T&E Fundamentals
- T&E/M&S for FCS
- Issues/Discussion/Recommendations

# **T & E Feedback to AMSEC**

**16-18 April 2002**

**Salt Lake City, Utah**

Theme: “*SMART: Transformation  
through M&S Collaboration*”

# Issues

# Discussion Points

# Discussion Points

# Recommendations

# Why T&E?

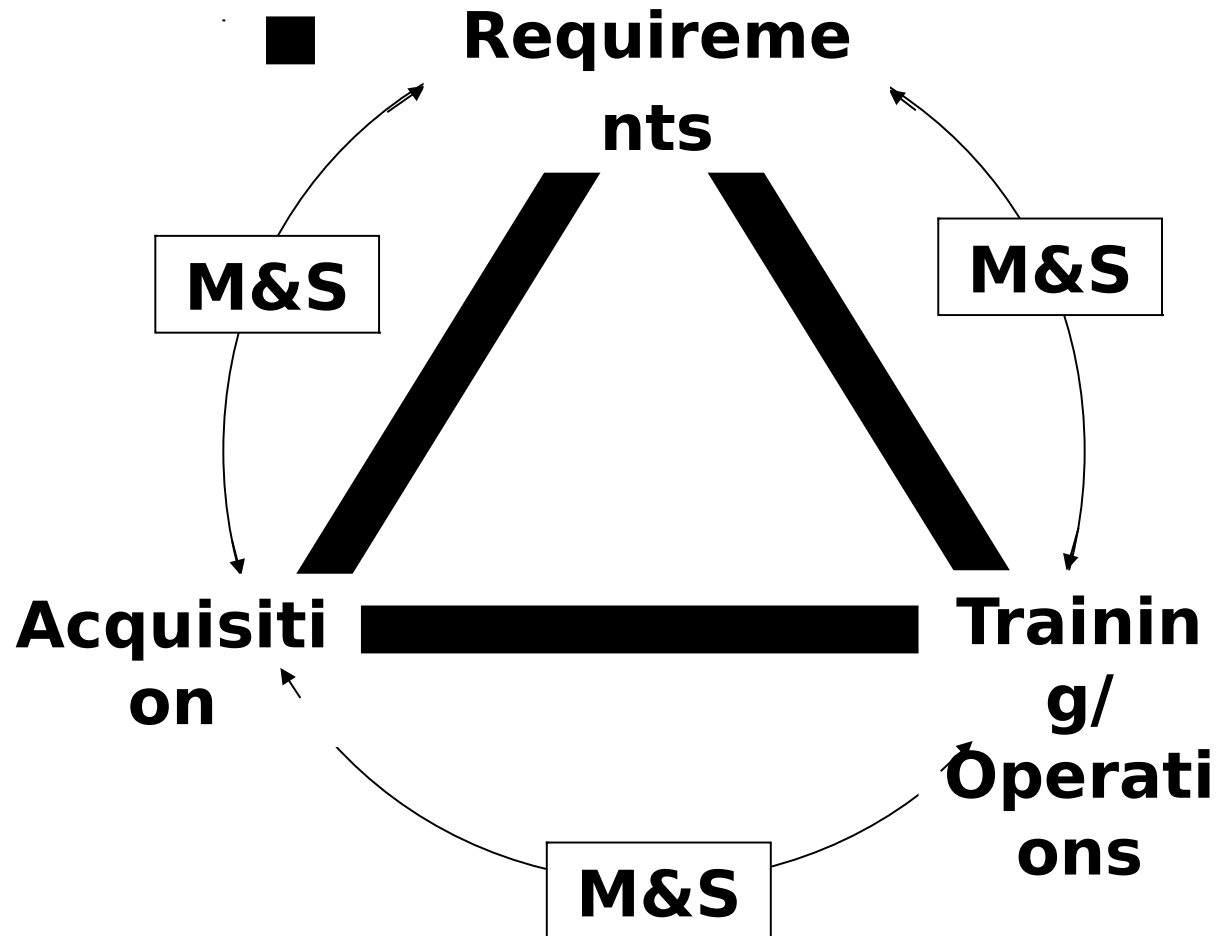
**We test to  
learn**

**We evaluate to  
understand**

**It's the right  
thing to do**

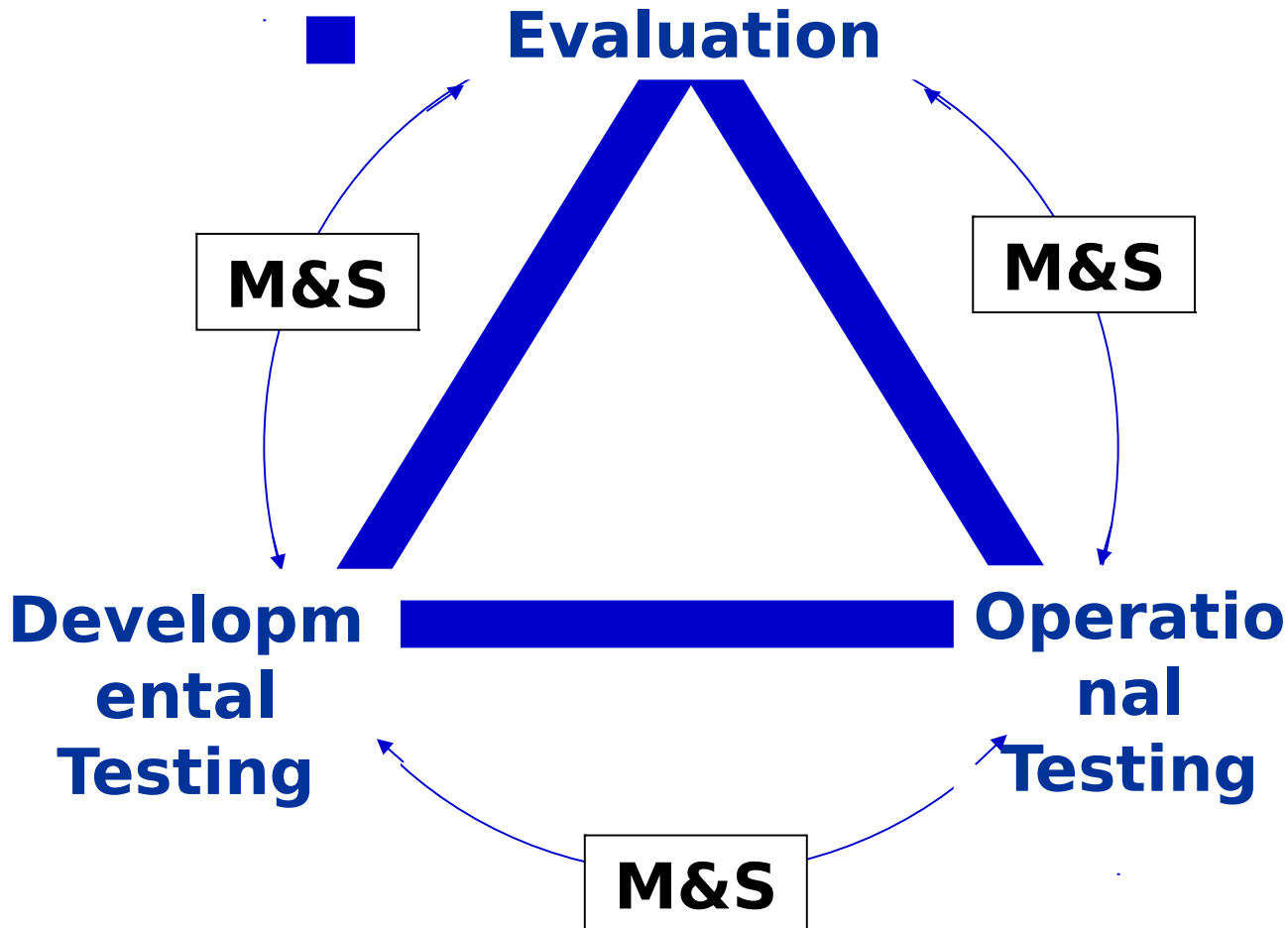


# SMART Collaboration





# M&S - T&E Integration



# **Some Thoughts on M&S and T&E**

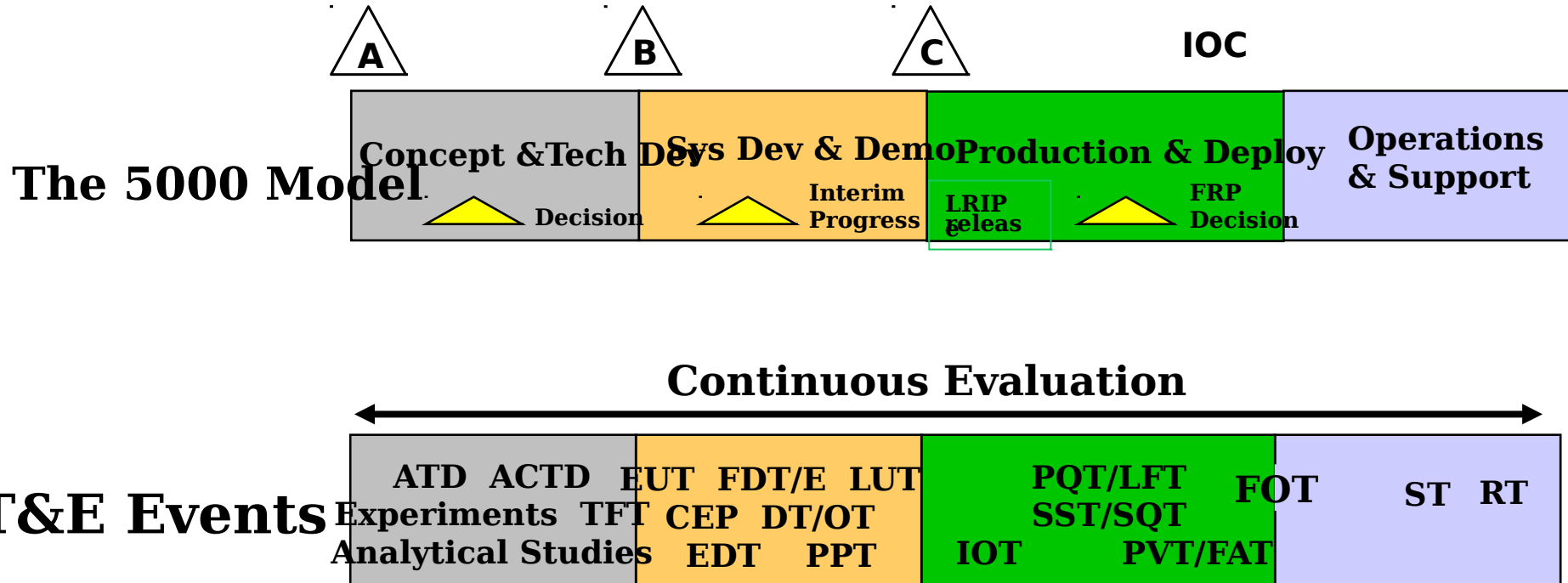
***“There is no reason that we have to choose between ‘test’ and ‘simulation’. They are not competing functions. Instead they are complementary and mutually supportive approaches to understanding weapon system performance.”***

**Jacques S. Gansler**

***“There’s only one way to speed up acquisition and that involves more and better testing”***

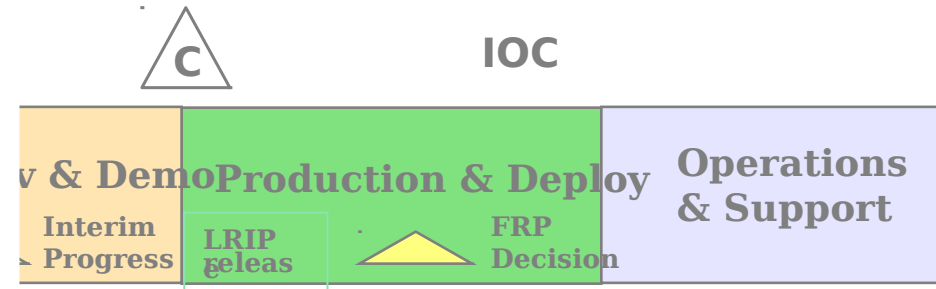
**Philip Coyle**

# Army T&E Overlay



# Army T&E Overlay

**Event Planning**  
**Event Rehearsal**  
**Synthetic Environments**  
**Event Control**  
**Data Collection**  
**Extended Analysis**



Continuous Evaluation

T&E

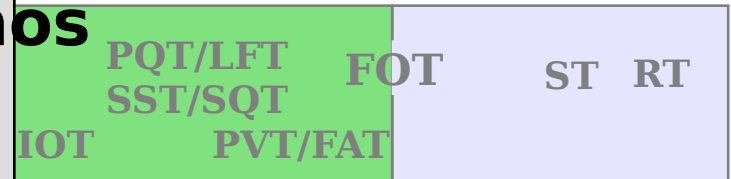
**Advanced Technology Demos**

**Adv Concept/Tech Demos**

**Experiments**

**Technical Feasibility Tests**

**Analytical Studies**

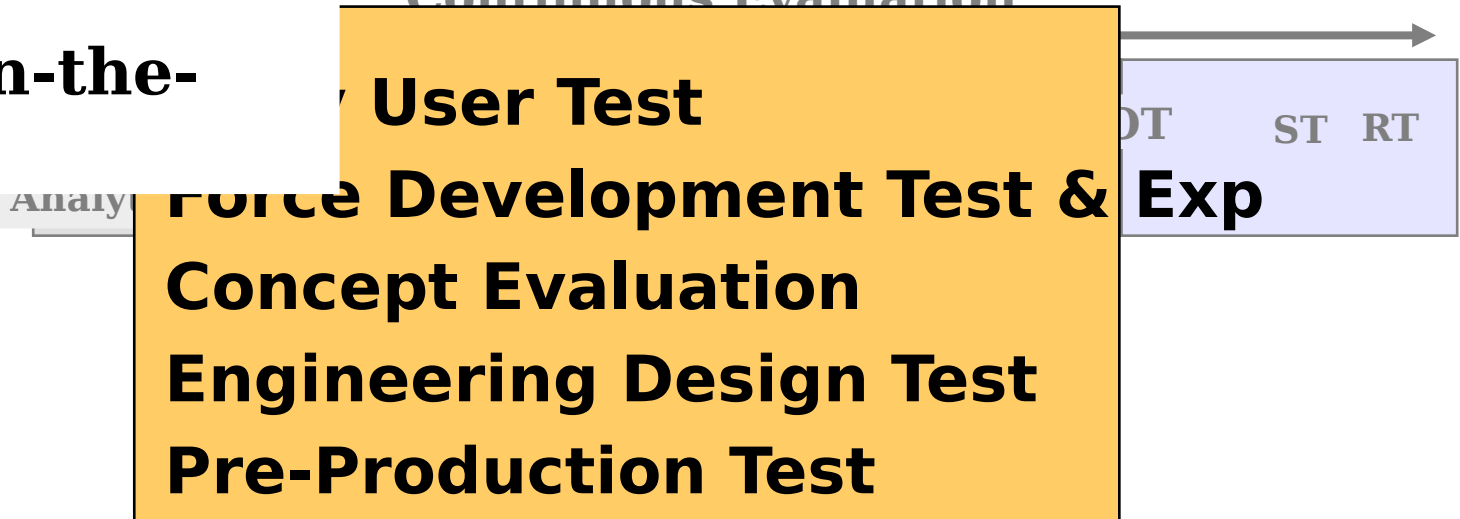


# Army T&E Overlay

**Event Planning**  
**Event Rehearsal**  
**Synthetic**  
**Environments**  
**Event Control**  
**Data Collection**  
**Component in the**  
**Loop**  
**Human-in-the-**  
**T&E Loop**



Continuous Evaluation



# Army T&E Overlay

**Synthetic Environments**

**Data Collection**

**Extended Analysis**

**T Component-in-the-Loop**

**Human-in-the-Loop**

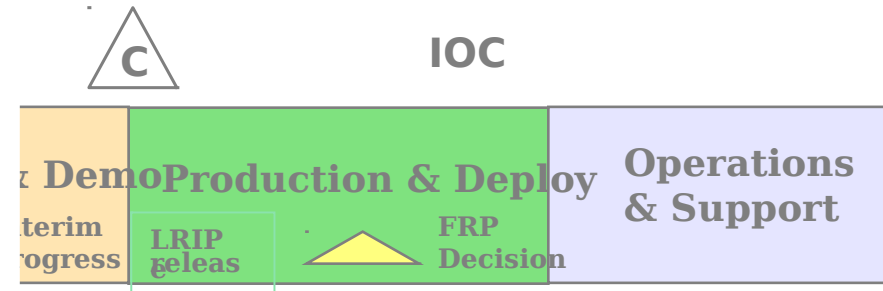
**Software-in-the-Loop**

**Hardware/System-in-the-**

**Loop**

**T&E Events**

ATD ACTD T FT  
Experiments TFT CEP  
Analytical Studies ED

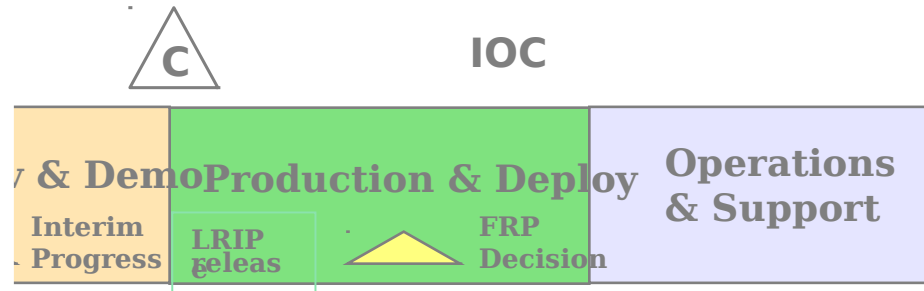


**Follow-on Operational Test**  
**Initial Production Test**  
**Shakedown**  
**Stockpile Reliability Test**  
**Malfunction Investigation**

# Army T&E Overlay

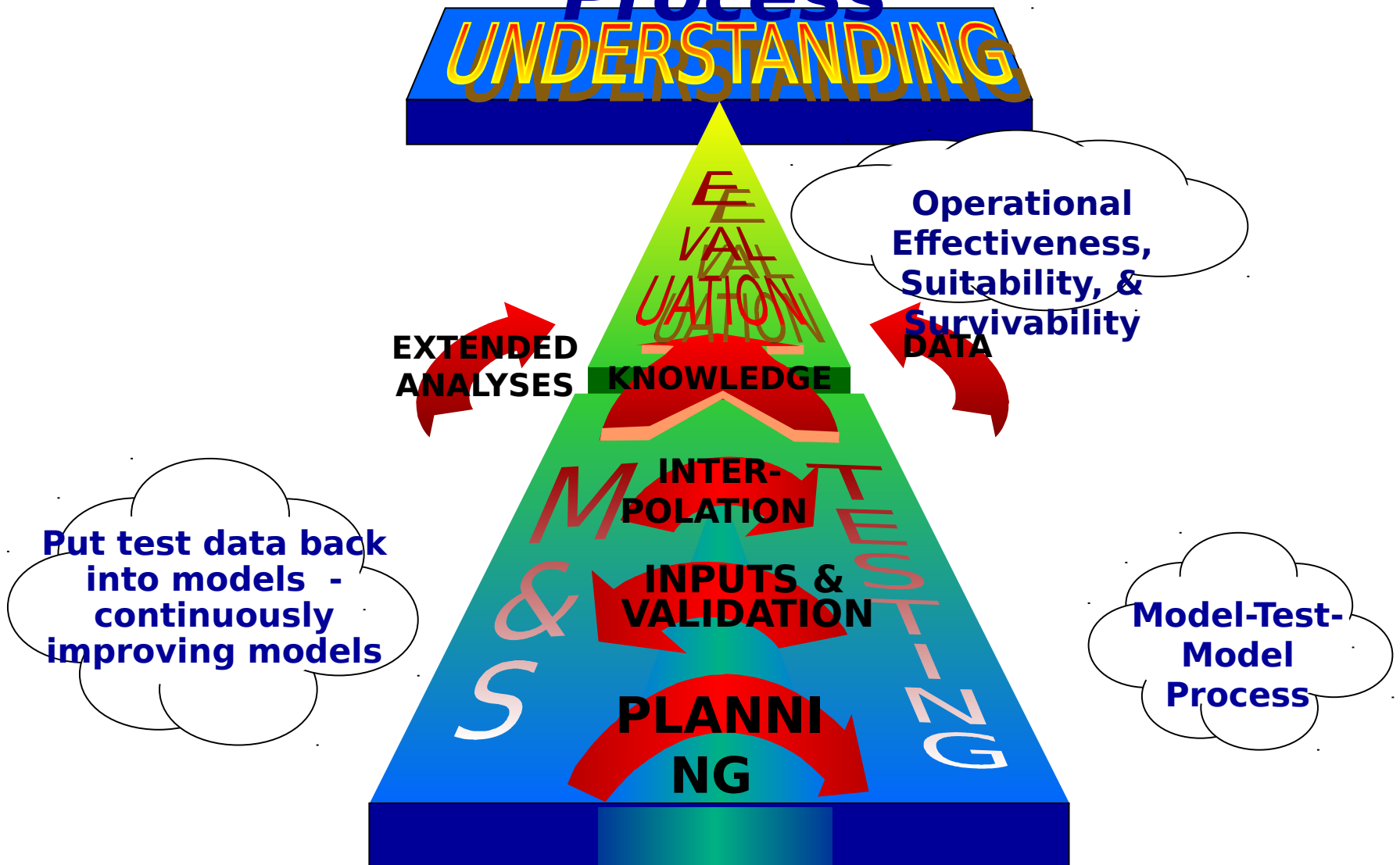
Event Planning  
 Event Rehearsal  
 Synthetic Environments  
 Event Control  
 Data Collection  
 Extended Analysis  
 Component-in-the-Loop  
 Human-in-the-Loop  
 Survivability/Lethality  
 Software-in-the-Loop  
 Distributed/System-in-the-

Loop



Production Qualification Test  
 Fire test  
 Form Software test  
 Software Qualification Test  
 Operational Test  
 Production Validation Test  
 First Article Test

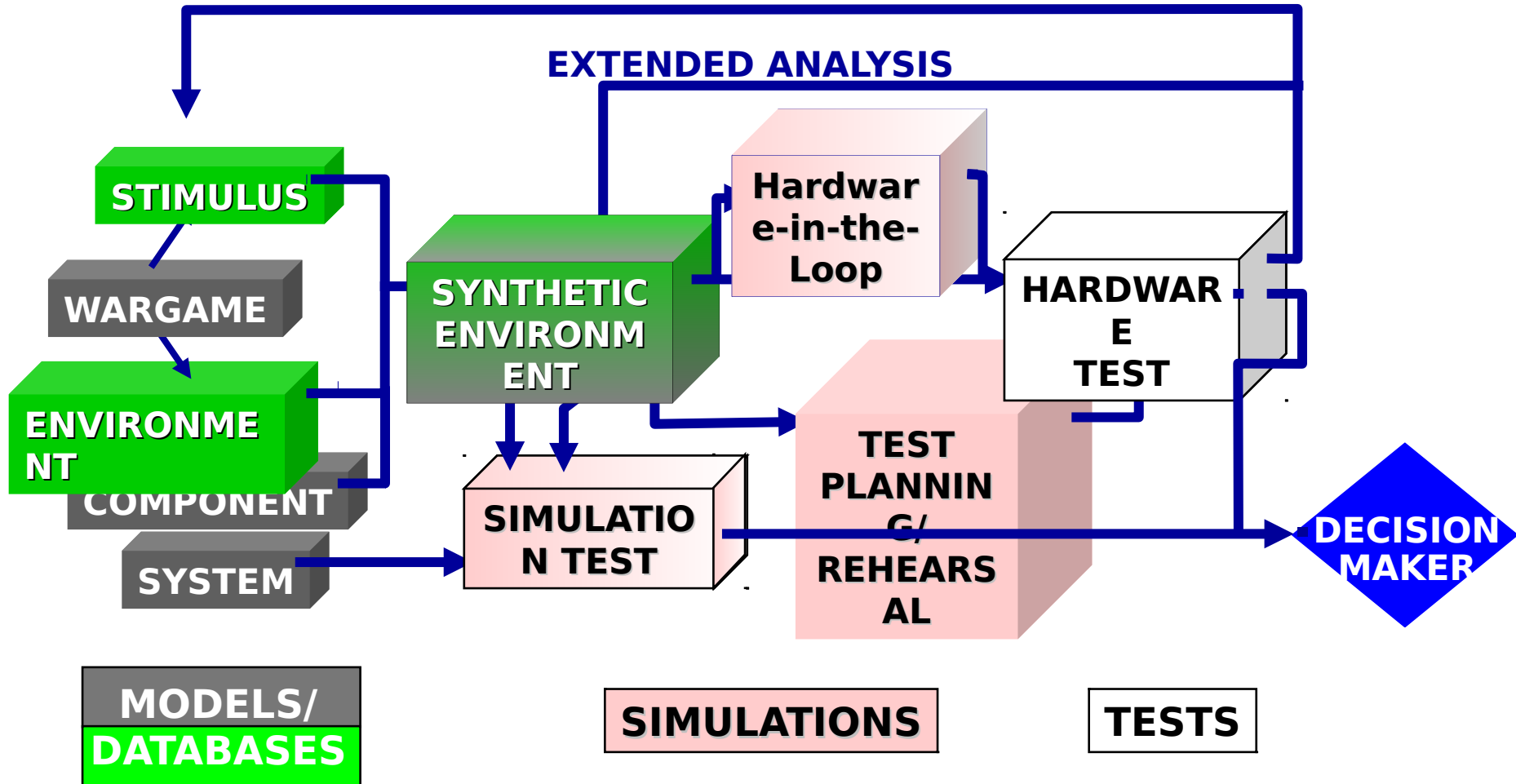
# Simulation Test & Evaluation Process





# How M&S Supports Army Test and Evaluation

VALIDATION - REFINEMENT



# ***T&E Accreditation***

**Any M&S Used to Support or Supplement  
Testing and Evaluation  
Must Be Accredited if the Results  
Directly or Indirectly  
Influence the Evaluation**

# ***Accreditation***

- The official **determination** that a model or simulation is acceptable for use for a specific purpose.

**AR 5-11, & DA Pam 5-11**

- The official **certification** that a model or simulation is acceptable for use for a specific purpose.

**Defense Modeling & Simulation  
Office**

# Similar Processes



**I&E**

**Evaluation Plan**

**Test Plan**

**Test**

**Test Report**

**Evaluation Report**

**Requirements**

Know the  
Intended Uses

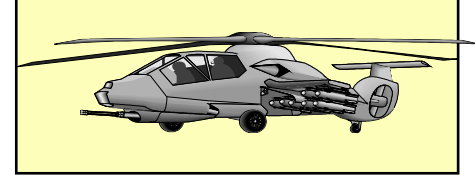
Identify  
Issues & Criteria

Determine Data  
Needs and Sources

Collect Data

Compare Data  
With Criteria

**Decision**



**VV&A**

**Accreditation Plan**

**V&V Plan**

**Test**

**V&V Report**

**Accreditation Report**

# **T&E Issues for SMART**

- **Identify Requirements/Opportunities/  
Alternatives for M&S in T&E**
- **Identify Obstacles to Collaboration**
- **“Resourcing” M&S**
- **V&V / Accreditation Issues**
- **FCS-Specific Issues:**
  - **Test strategy for complex system-of-systems**
  - **Single Suite of Models Across Program**
  - **Develop Systems and Doctrine Concurrently**

# **VV&A Issues for SMART**

- **Evaluator relies on models developed by others**
  - T&E requirements must be recognized in model development
- **Impact of the model on the overall evaluation**
  - How much risk is associated with using the model?
- **Quantifying acceptability criteria**
  - How much fidelity is needed for this part of the evaluation?
  - Evaluator must use whatever fidelity the model developer provides
- **Accrediting classes of applications and specific applications**
  - Data VV&A addressed?